

NEWBORN SERIES

Nurturing newborns in South Sudan series: Essential care for the small baby

Isaac Gawar¹ and Grace J. Soma²

1. Paediatrician, South Sudan
Paediatrics Association, South Sudan
2. Paediatrician, Editorial Assistant,
South Sudan Medical Journal

Correspondence:

Grace J. Soma

diktora.grace@gmail.com

Submitted: March 2021

Accepted: April 2021

Published: May 2021

Introduction

“Nurturing newborns in South Sudan” is a series of clinical guidance reviews on newborn care for the South Sudan context. The first part of this series focused on essential care of the newborn giving standard recommendations for the birth, delivery and care of all newborns not in need of emergency lifesaving care immediately after birth.^[1] Once out of danger, these newborns should receive the essential care package. The second part of this series reviews essential care for babies who are born ‘small’. Babies who are born preterm (before 37 weeks gestation) and those with low birth weight (less than 2.5kg) fall under this category of ‘small’.

The complications, interventions and care for preterm and low birth weight are broad and cannot be comprehensively covered in this paper. In a later review, we will focus on priority interventions and care for preterm and low birth weight babies reviewing topics like assessment and management of jaundice and diagnosis and treatment of seizures among others.

Defining the ‘small baby’ and risk factors

In this article, babies are defined as “small” based on whether they have low birth weight and/or were born preterm. Low birth weight babies are classified as: low birth weight <2.5kg irrespective of gestational age, very low birth weight <1.5kg and extremely low birth weight <1.0kg.^[2] Premature or preterm babies are generally defined as babies born before 37 completed weeks of gestation^[2] and are further classified as: extremely preterm <28 weeks, very preterm- 28 to 32 weeks and moderate to late preterm 32 to 37 weeks.

There are several risk factors for preterm birth and low birth weight and these include: previous birth of a small baby, multiple pregnancy, tobacco use and substance abuse, maternal infections, chronic medical conditions in the mother such as hypertension and diabetes mellitus, pregnancy complications necessitating early delivery and short intervals between pregnancies (less than 18 months).^[3] Young age of the mother and poor nutrition are additional risk factors. Sometimes the cause of a small baby is unknown and some babies, with small parents, will be born small. A few preterm babies may not have a low birth weight - for example if they are born large for gestational age due to maternal diabetes mellitus - but they will experience problems similar to those of small babies due to their prematurity.

Prematurity

More than one in ten babies are born prematurely equating to about 15 million babies per year worldwide. This number continues to rise. Complications related to preterm births caused about one million deaths among children less than five years old in 2015, making it the leading cause of death and morbidity in this age group.^[4] Beyond the newborn period, babies born prematurely experience disabilities related to learning, vision and hearing and neuromotor complications like cerebral palsy.^[5,6]

The preterm birth rate in South Sudan increased from 12.0% in 2014^[7] to about 13.0% as reported in 2017- a total of 59,000 babies. Among those children born prematurely, about 2,700 of them were born as ‘extremely premature’ - that is less than 28 weeks gestation. About 1,300 of these were impaired preterm

Citation:

Gawar & Soma. Nurturing newborns in South Sudan series: Essential care for the small baby. South Sudan Medical Journal 2021; 14(2):46-52 © 2021 The Author
(s) License: This is an open access article under [CC BY-NC-ND](https://creativecommons.org/licenses/by-nc-nd/4.0/)

Assessment of risk for birth of a small baby for all pregnant women

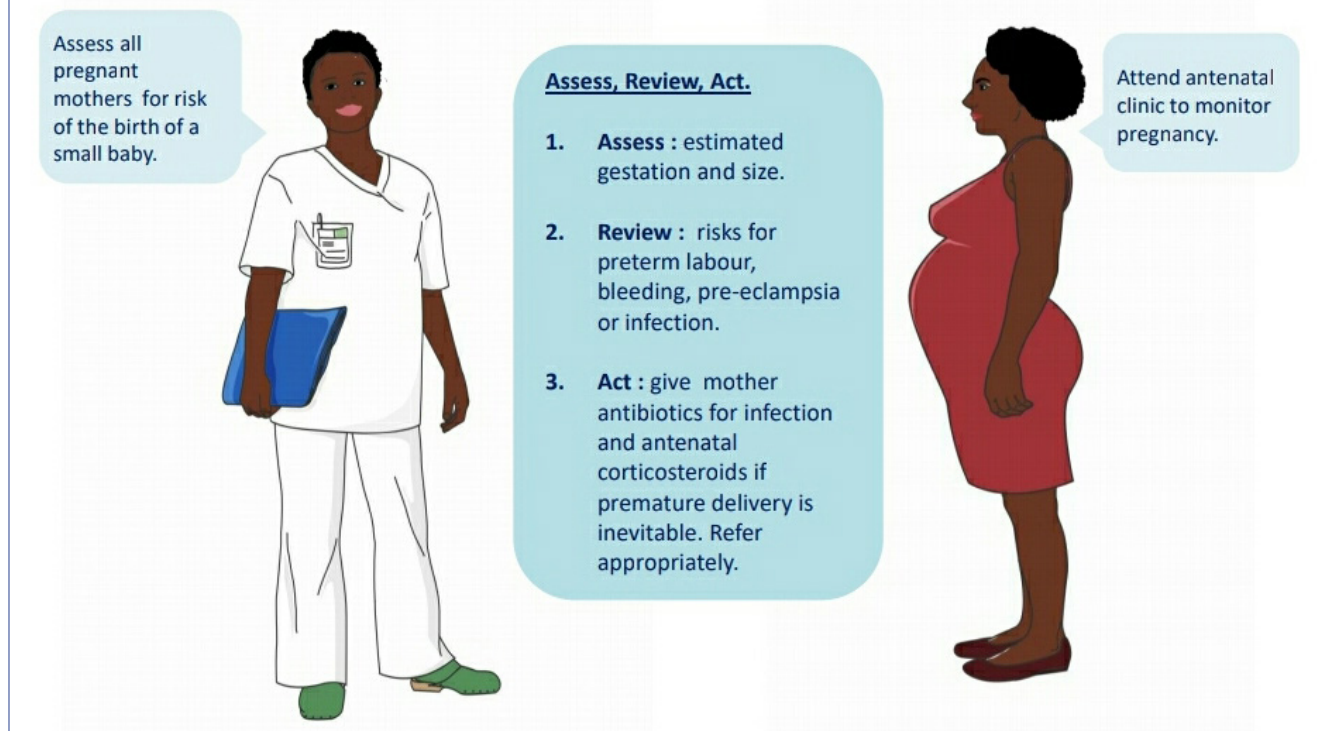


Figure 1. Preparation and assessment of risk for the birth of a small baby for all pregnant women. Source: Soma GJ. People images adapted from smart.servier.com.

survivors and there were 4,600 direct preterm child deaths per year. There are limited data on prematurity and its risk factors in South Sudan but a high adolescent birth rate at 158 per 1000 girls is reported.^[8]

About half of the children born before 32 weeks in low resource settings like South Sudan do not survive and yet low-cost effective interventions that would save approximately 75% of these newborns are available. These interventions include kangaroo care for thermal and breastfeeding support in babies less than 2kgs, antenatal steroids to stimulate lung maturity, magnesium sulphate for neuroprotection, antibiotics, safe oxygen use and midwife led continuity of care for newborns, the latter leading to a 24% reduction in the risk of preterm births.^[6]

There are existing national policies for kangaroo care and antenatal corticosteroids use in South Sudan but none for specific care of the preterm, safe oxygen use and use of continuous positive airway pressure machines^[8] which, despite availability in some facilities, the necessary infrastructure for use and maintenance is lacking.^[9]

Identification, assessment and classification of small babies

Identifying if a baby is term or preterm helps to accurately interpret breathing, feeding and activity to determine

whether the problems are due to prematurity or danger signs and to make preparations for their specialized care or intervention at birth, delivery and in the critical first weeks of life. More important than just identifying if an infant is small is being able to quickly classify them as well or unwell to ensure that they receive appropriate care and lifesaving treatment in a timely manner.^[10]

Preparation and assessment of risk for the birth of a small baby should be made for all pregnant women.^[11] Figure 1 shows how to assess the risk for the birth of a small baby in pregnant women through three steps: Assess, Review and Act.

Identification of the small baby

After birth, all babies should be assessed to determine if they are small and this can be done by measuring their weight and clinically examining for features of prematurity, see Table 1.^[11]

Assessment and classification of wellness or danger signs in the small baby

After assessment and identification as 'small', all small babies should be classified as either well or unwell within 90 minutes to inform further care. This can be delayed for up to four hours if the baby has feeding difficulties and any of the danger signs (Table 2).

Table 1. Identification of features of prematurity

	Term Poor Growth	Preterm / Premature
Foot	Length >8cm Creases all over sole	Length <8cm Few creases on sole
Ear	Good recoil	Thin slow recoil
Skin	Opaque, loose with folds	Thin, translucent
Genitalia	Testes in scrotum, wrinkled Labia closed	Testes high Scrotum smooth Labia open

Classification is based on the baby's weight, temperature, and examination (Table 2). Babies less than 1,500 grams are almost always premature and often will need special care such as intravenous fluids at higher level facilities. Small babies have better outcomes when born at facilities that have the capacity for use of antenatal steroids, resuscitation, and oxygen, and breathing and thermoregulatory support and are under the care of a skilled health workers.^[10,11]

Essential care and special considerations for the small baby

The small baby needs extra attention in all the steps of essential newborn care and routine ongoing assessment, led by their mothers/caregivers with assistance of health cadres. The small 'well' baby will require only simple supportive care at and after delivery.

These babies should be dried with a clean, dry towel, maintained in skin to skin contact with the mother (kangaroo care), covered to maintain heat, with breastfeeding initiated within the first hour to prevent hypoglycaemia.^[12,13,14,15] These supportive measures have proven to be cost effective and easy to be implemented if adequate training is done in a country like South Sudan. Other special considerations are outlined below.

Prenatal steroids and magnesium sulphate

Premature infants with very low and extreme low birth weight are at higher risk of respiratory distress syndrome. This risk can be reduced by the use of intramuscular dexamethasone, two doses of 12mg 24 hours apart for

pregnant mothers at risk of premature delivery.^[13,16,17] The other benefits for babies with prenatal steroid use are a significant reduction in mortality and intraventricular cerebral haemorrhage.

Magnesium sulphate(intravenously at a loading dose of 4g in 200 mls of normal saline given slowly in 20 to 30 minutes, then 1g/hour until delivery or for 24 hours, whichever came first)is also proven to have a neuroprotective role when given to a mother anticipating a preterm baby delivery (≤ 32 weeks of gestation).^[13]

Cord clamping and cord care

Delayed cord clamping for one to three minutes significantly increases the haemoglobin level for both term and preterm babies and reduces the risk of anaemia in infancy. Premature babies attain better circulatory stability, have reduced risk of intraventricular cerebral haemorrhage, reduced risk of necrotizing enterocolitis, and less late-onset sepsis after delayed cord clamping.^[17,18]

Application of chlorhexidine (4%) to the umbilical cord stump for the first week after birth is recommended for infants born at home in settings with high mortality (30 or more deaths per 1,000 live births) while dry cord care is suitable for babies born in a controlled environment such as hospitals and primary health care centres. The mother should be educated on personal hygiene measures like hand washing when caring for the baby.^[12,14]

Thermal care

Small babies who are well and clinically stable should receive kangaroo care starting immediately after birth and continued at all the times, day and night, aiming at a core body temperature of 36-37°C with the feet warm and pink. In case the caretaker (mother or anyone who is committed to care for the baby) is unable to provide kangaroo care, other methods of warming the baby can be used such as placing in a clean and disinfected radiant warmer or incubator.^[12,14] Figure 2 demonstrates kangaroo care.^[19]

Breathing support

The small baby who is unwell is more likely to have breathing problems at or immediately after birth and

Table 2. Classification of the 'small baby' and danger signs

The WELL small baby	DANGER SIGNS	The UNWELL small baby
<ul style="list-style-type: none"> • Weighs between 1500 and 2500 grams and • Maintains a normal temperature with thermal care and • Breathes well; no difficulty in breathing, fast breathing or severe chest wall in-drawing 	<ul style="list-style-type: none"> • Fast breathing with a respiratory rate of more than 60 breaths/minute or severe chest in drawing • Temperature <35.5oC or >37.5oC • No movement • Convulsions 	<ul style="list-style-type: none"> • Weighs less than 1500 grams or • Develops a problem or danger signs (described in the middle column.)

KANGAROO CARE

Procedure for Kangaroo Care

1. Dress infant only in nappy, hat and socks.
2. Place skin to skin on mother's chest between breasts with head turned to one side.
3. Tie infant to the mother with cloth.
4. Cover mother and infant with mother's clothes.
5. Encourage frequent breastfeeding.



Fathers can do Kangaroo Care too!

Figure 2. How to hold the baby for kangaroo care. Adapted with permission from World Health Organization (WHO). Source: Kangaroo mother care. A practical guide. (WHO.^[19] People images adapted from smart.servier.com.

will require resuscitation and respiratory support. Such newborns will present with clinical features of respiratory distress syndrome (tachypnoea, expiratory grunt, intercostals and sub-costal recession and cyanosis) due to a deficiency of surfactant which helps to keep the alveoli open. Continuous positive airway pressure therapy for newborns with respiratory distress syndrome should be started with caution as soon as the diagnosis is made; aiming at oxygen saturations of $>90\%$ but $<95\%$ because excess oxygen can cause injury to the lungs, brain and eyes.

Small babies with respiratory distress will require further specialized care including temperature maintenance, and IV antibiotics (as it is hard to exclude pneumonia as a cause of respiratory distress); they may also need to be nil by mouth and receive maintenance IV fluids.^[12,14]

Premature babies are at risk of apnoea which is defined as pauses in breathing for more than 15 to 20 seconds or pauses for less than 15 seconds but with a slow heart rate (<100 beats per minute) or low oxygen saturation level $<80\%$ for ≥ 4 seconds) due to immaturity and/or depression of the central respiratory drive to the muscles of respiration.^[20] Small babies should be started on caffeine citrate/aminophylline for prevention/treatment of apnoea. Mothers who care for their babies using kangaroo care can identify their babies when they have abnormal breathing (including apnoea) if provided with suitable training. In addition, kangaroo care is reported to decrease apnoea

episodes in babies born preterm.^[21]

Management of infections

Premature babies are at high risk of infection such as sepsis, pneumonia, meningitis, omphalitis due to their underdeveloped immunity. Clean cord care as described above and hygiene while caring for the baby will go a long way to reducing infections. Babies who display danger signs or who are at risk of infection (due to premature rupture of membranes or maternal infection) should be treated with ampicillin (or penicillin) and gentamicin as the first line antibiotic treatment for at least 10 days.^[12,14]

Feeding

Low birth weight babies who are stable and have strong suckling reflexes should be allowed to breastfeed. Early feeding will prevent hypoglycaemia which is common with small babies and it necessitates monitoring at least 6-hourly for the first day of life.

Small babies unable to breastfeed should be given expressed breast milk with a cup and spoon. The infant who is unable to feed from a cup and spoon should be given intermittent bolus feeds through a gastric tube. The enteral feeds are increased gradually by 20-30mls/kg/day to a maximum of 180mls/kg/day calculated based on the highest weight the baby had attained.^[12]

Smaller babies are at higher risk of feeding problems and

Table 3. A proposed plan for IV fluids and enteral feeds for preterm babies

Day	Total feeds+ IV fluids	IV fluid	Expressed breast milk/ formula milk
1	60mls/kg/day	Dextrose 10%; 50mls/kg/day	10mls/kg/day
2	90mls/kg/day	Dextrose 5%+ ½ normal saline; 50 mls/kg/day	40mls/kg/day
3	120mls/kg/day	Dextrose 5%+ ½ normal saline; 50mls/kg/day	70mls/kg/day
4	150mls/kg/day	Dextrose 5%+ ½ normal saline; 50 mls/kg/day	100mls/kg/day
5	150mls/kg/day	Dextrose 5%+ ½ normal saline; 20 mls/kg/day	130mls/kg/day
6	150mls/kg/day		150mls/kg/day
7	180mls/kg/day		180mls/kg/day

necrotizing enterocolitis. Enteral feeds should be given in boluses and preferably every 2-3 hours. This should begin on the first day with 10-15mls/kg/day of enteral feeds (trophic feeds) with the remaining fluid requirement met by intravenous fluids (10% dextrose).

On the second and further days enteral feeds should be increased by 20-30 mls/kg/day, and the remaining fluid requirement should contain dextrose 10% and electrolytes.^[12,14] The aim should be to establish feeding within 5-7 days so the IV drip can be removed (Table 3).

Other routine care: eye care, vitamin K, HIV prophylaxis

Cleaning both eyes and the application of tetracycline eye ointment are part of essential care to prevent infections such as ophthalmia neonatorum or bacterial conjunctivitis (See table 4). Vitamin K should also be given, but at a much lower dose of 0.5mg IM for babies who weigh less than 1.5kg. Vitamin K prevents haemorrhagic disease of the newborn.^[12,14]

Small babies born to HIV positive mothers should receive dual prophylaxis with AZT (twice daily) and NVP (once daily) for the first 6 weeks of their life. Those who are high risk of acquiring HIV infection should continue infant prophylaxis for an additional 6 weeks (total of 12 weeks of infant prophylaxis) using either AZT (twice daily) and NVP (once daily) or NVP.^[12,14]

Immunization

Infants born prematurely or with low birth weight should be vaccinated using the same schedules as those recommended for full term infants, with the exception of the hepatitis B vaccine due to the reduced immune response in infants less than 2,000 kg.^[12,14,22]

Postnatal visits and follow up care

Babies with low birth weight can be discharged when they have no danger signs or signs of infection, are gaining weight on breast feeding alone, can maintain their temperature in the normal range 36-37°C in an open

cot and the mother is confident and able to take care of the baby. The suitable weight for discharge is 1.8 kg and above because at this time the baby should be able to suckle the breast well. Before discharge caregivers should be counselled thoroughly on exclusive breast feeding, keeping the baby warm (kangaroo care), and the danger signs for seeking urgent medical care.^[12]

Babies with low birth weight should have regular follow up upon discharge from the hospital/health centre weekly until their weight is 3 kg.^[12] Weight gain should be calculated, modalities of feeding and feeding challenges should be discussed, assessment of wellbeing and danger signs should be done, and the neurodevelopment assessment (after correcting for the gestation age) should be carried out at any point of care.^[12] Community health workers (through the South Sudan Boma Health Initiative) if trained should provide home based follow up care for low birth-weight babies on kangaroo care discharged from health facilities.^[23] Caregivers need continued friendly psychosocial support and their readiness to care for these small babies should always be assessed and praised.^[24]

Further strategies to reduce the risk of delivery of small babies

The following strategies are vital in reducing the numbers of babies who are born small.^[3]

- Providing women access to health care before and between pregnancies,
- Identifying women at risk for preterm delivery and offering effective treatments to prevent preterm birth,
- Preventing unintended pregnancies and waiting at least 18 months between pregnancies.

Conclusion

Beyond ensuring small babies survive and thrive, it is important to empower families and caregivers to be able to care confidently for their babies at home, ensuring proper psychosocial support and regular follow up at the

Table 4. Dosages and routes of administration for commonly used drugs for newborns

	Drug	Daily/Maintenance/ initial dose	Maximum dose/ loading dose
1	Caffeine citrate (oral/IV) (IV is given over 30mins)	5mg/kg	20mg/kg
2	Aminophylline (IV) (IV is given over 15-30mins)	2.5mg/kg 12 hourly	6mg/kg
3	Vitamin K (IM)	0.4mg/kg for premature baby and 1mg for term baby	
4	Tetracycline eye ointment	Applied in both eyes at birth	
5	Ampicillin (IV/IM)	50mg/kg 12 hourly in the first week of life Weeks 2-4 of life every 8 hours	
6	Benzyl penicillin (IV)	50000 IU/kg 12 hourly Weeks 2-4 of life, every 6hours	
7	Gentamicin (IV/IM)	3-4mg/kg once a day	
8	Cefotaxime	50mg/kg 12 hourly in first week of life Weeks 2-4 of life every 8 hours Note: Age Specific doses: Less than 29 weeks (extreme preterm); give -12 hourly if less than 28 days of life and -8 hourly if more than 28 days of life If 30-36 weeks (moderate to late preterms); give -12 hourly for the first 2 weeks of life and - 8 hourly after 2 weeks of life	
9	Ceftriaxone/ (IV/IM)	50mg/kg 12 hourly	

health facility. As with all other newborns, assessment for danger signs should be made at every visit.^[1]

Through this review, we have seen that there are low cost and high impact interventions for essential care for small babies that are vital for increasing their chances of survival and which can be implemented in South Sudan. Continuous health education and training on these interventions will go a long way in increasing their coverage.

Acknowledgements: We thank our reviewer and Nancy MacKeith for help in preparing this paper.

We received no funding and have no conflicts of interest.

References

1. Soma GJ. Nurturing newborns in South Sudan series: Essential care of the newborn. 2020;13(3):99–103.
2. World Health Organization. Born too soon. The Global Action Report on Preterm Birth. 2012 https://www.who.int/pmnch/media/news/2012/201204_borntoosoon-report.pdf
3. New York Times. Inside a Neonatal Clinic in South Sudan: 'In Some Ways, It Felt Wrong to Be Here'. <https://www.nytimes.com/2018/08/28/insider/south-sudan-neonatal-clinic.html>
4. World Health Organization. Preterm birth. WHO Fact Sheet. <https://www.who.int/news-room/fact-sheets/detail/preterm-birth>
5. Colvin M, McGuire W, Fowlie PW. Neurodevelopmental outcomes after preterm birth BMJ. 2004 Dec 11; 329(7479): 1390–1393. doi: 10.1136/bmj.329.7479.1390
6. Centers for Disease Control and Prevention C. Premature Birth. 2017; 2017–9. <https://www.cdc.gov/reproductivehealth/features/premature-birth/index.html>

7. USAID. Every Preemie Scale. Status of preterm and low birth weight demographics, risk factors and health system responsiveness in USAID'S 23 MCH priority countries. https://www.everypreemie.org/wp-content/uploads/2016/05/SummaryProfile_4.29.pdf
8. USAID. Every Preemie Scale- South Sudan country profile for preterm and low birth weight. 2017;(1). https://www.everypreemie.org/wp-content/uploads/2019/07/SouthSudan_7.5.19.pdf
9. World Health Organization. Care of the preterm and low birth weight newborn. (November 2018):5–7. https://www.who.int/maternal_child_adolescent/newborns/prematurity/en/
10. American Academy of Pediatrics. Essential Care for Small Babies Provider Guide. 2015. 7-17p.
11. American Academy of Pediatrics. Essential Care for Small Babies Facilitator Guide. 2015.3-8p.
12. World Health Organization. Pocket book of hospital care for children: guidelines for the management of common childhood illnesses. World Health Organization 2013; 45-72.
13. World Health Organization. WHO recommendations on interventions to improve preterm birth outcomes. www.who.int/reproductivehealth
14. World Health Organization. WHO recommendations on newborn health: guidelines approved by the WHO Guidelines Review Committee. World Health Organization; 2017.
15. World Health Organization. WHO recommendations on postnatal care of the mother and newborn. World Health Organization; 2014.
16. Kemp MW, Newnham JP, Challis JG, Jobe AH, Stock SJ. The clinical use of corticosteroids in pregnancy. *Hum Reprod Update*. 2016; 22(2):240–59.
17. Heike R, Gillian ML, Gyte José L, Díaz-Rossello LD. Effect of timing of umbilical cord clamping and other strategies to influence placental transfusion at preterm birth on maternal and infant outcomes. *Cochrane Syst Rev-Interv*. 2019; 5–7.
18. Leante Castellanos JL, Pérez Muñuzuri A, Ruiz Campillo CW, et al. Recomendaciones para el cuidado del cordón umbilical en el recién nacido. *An Pediatría*. 2019; 90(6):401.e1-401.e5.
19. World Health Organization. Kangaroo mother care. A practical guide. 2003. 1–54 p. <https://www.who.int/publications/i/item/9241590351>
20. Zhao J, Gonzalez F, Mu D. Apnea of prematurity: from cause to treatment. *European Journal of Pediatrics*. 2011 Sep 1;170(9):1097-105
21. Montealegre-Pomar A, Bohorquez A, Charpak N. Systematic review and meta-analysis suggest that Kangaroo position protects against apnoea of prematurity. *ActaPaediatrica*. 2020 Jul;109(7):1310-6.
22. World Health Organization. Summary of WHO Position Papers - Recommendations for Routine Immunization Table 1: Summary of WHO Position Papers - Recommendations for Routine Immunization. 2018 December:1–11.
23. Lutwama GW, Kok M, Jacobs E. An exploratory study of the barriers and facilitators to the implementation of community health worker programmes in conflict-affected South Sudan.
24. Petty J, Whiting L, Green CF J. Parents' views on preparation to care for extremely premature infants at home. 2018. <https://pubmed.ncbi.nlm.nih.gov/29975481/>